

Dent
A3

WHAT IS CLAIMED IS:

1. An active matrix organic electroluminescence display device comprising:
 - a scan line in one direction;
 - a data line substantially perpendicular to the scan line;
 - a power line substantially parallel to the data line, keeping a distance with the data line;
 - an electroluminescence device emitting light in a pixel region among the scan line, the data line and the power line;
 - a switching transistor for switching a signal of the data line according to a signal of the scan line; and
 - a driving transistor for applying a power supply of the power line to the electroluminescence device according to a signal applied through the switching transistor, the switching transistor formed by a sequential lateral solidification (SLS) method.
2. The active matrix organic electroluminescence display device as claimed in claim 1, wherein the SLS method is any one of an SLS high-throughput poly-Si, an SLS directional poly-Si, and an SLS x-Si (crystal-Si).
3. The active matrix organic electroluminescence display device as claimed in claim 1, further comprising a capacitor storing electrons according to a difference between a voltage of data signal applied to the data line and a voltage provided from the power line.
4. An active matrix organic electroluminescence display device comprising:
 - a plurality of scan lines in one direction;
 - a plurality of data lines substantially perpendicular to the scan line to define a plurality of pixel regions;

a plurality of power lines substantially parallel to the data line and a distance from the data line;

an electroluminescence device emitting light in each of the pixel regions among the scan line, the data line and the power line;

a switching transistor for switching a signal of the data line according to a signal of the scan line in each of the pixel regions;

a driving transistor for applying a power supply of the power line to the electroluminescence device according to a signal applied through the switching transistor in each of the pixel regions;

a gate driver IC having a plurality of transistors for applying a scan signal to each scan line; and

a data driver IC having a plurality of transistors for applying a data signal to each data line;

wherein the switching transistor, the driving transistor and the transistors in the gate drive IC and the data drive IC are formed by a sequential lateral solidification (SLS) method.

5. The active matrix organic electroluminescence display device as claimed in claim 4, wherein the switching transistor and the driving transistor are formed by low temperature polysilicon low temperature process and a scanning method.

6. The active matrix organic electroluminescence display device as claimed in claim 4, wherein the SLS method is formed any one of an SLS high-throughput poly-Si, an SLS directional poly-Si and an SLS x-Si (crystal-Si).

7. A method for manufacturing an active matrix organic electroluminescence display device comprising the steps of:

- depositing an amorphous silicon on a substrate;
- crystallizing the amorphous silicon to a polysilicon by an SLS method;
- forming first and second semiconductor layers in portions where switching and driving transistors will be formed by selectively removing the crystallized poly silicon;
- forming a gate insulating film on an entire surface of the substrate including the semiconductor layers;
- forming a scan line to cross the first semiconductor layer on the gate insulating layer and a gate electrode of the driving transistor to cross the second semiconductor layer;
- forming source and drain regions of switching and driving transistors on the first and second semiconductor layers at both sides of the scan line and the gate electrode of the driving transistor;
- depositing an insulating interlayer on the entire surface of the substrate;
- forming contact holes to expose the source and drain regions of the first semiconductor layer, the gate electrode of the driving transistor and the source region of the second semiconductor layer, respectively;
- forming a data line connected to the source region of the first semiconductor layer substantially perpendicular to the scan line on the insulating interlayer; a power line connected to the source region of the second semiconductor layer substantially perpendicular to the scan line, the scan line overlapped with the gate electrode of the driving transistor; and an electrode pattern to connect the drain region of the first semiconductor layer to the gate electrode of the driving transistor;
- forming an insulating layer for planarization having a contact hole to the drain region of the second semiconductor layer; and

forming an electroluminescence device connected to the drain region on the insulating layer.

8. The method as claimed in claim 7, wherein the scan line and the gate electrode of the driving transistor are isolated from each other.

9. The method as claimed in claim 7, wherein the gate electrode is widened at a certain region to form a capacitor overlapped with the power line.

10. The method as claimed in claim 7, wherein the amorphous silicon is crystallized to a polysilicon by emitting a laser beam of about $2 \mu\text{m} \times 10 \text{ mm}$ to have an exposing area of about $10 \times 10 \text{ mm}^2$ or less in the SLS method.

11. The method as claimed in claim 7, wherein, in the SLS method, the beams are primarily emitted to the amorphous silicon, and subsequently, the beams are secondarily emitted to portions crystallized by the primarily emitted beams, thereby crystallizing the amorphous silicon to the polysilicon.

12. An active matrix organic electroluminescence display device comprising:

- a scan line in one direction;
- a data line substantially perpendicular to the scan line;
- a power line substantially parallel to the data line, keeping a distance with the data line;
- an electroluminescence device emitting light in a pixel region among the scan line, the data line and the power line;

a switching transistor for switching a signal of the data line according to a signal of the scan line; and

a driving transistor for applying a power supply of the power line to the electroluminescence device according to a signal applied through the switching transistor, the driving transistor formed by a sequential lateral solidification (SLS) method.

13. The active matrix organic electroluminescence display device as claimed in claim 12, wherein the SLS method is any one of an SLS high-throughput poly-Si, an SLS directional poly-Si, and an SLS x-Si (crystal-Si).

14. The active matrix organic electroluminescence display device as claimed in claim 12, further comprising a capacitor storing electrons according to a difference between a voltage of data signal applied to the data line and a voltage provided from the power line.

RECORDED IN U.S. PATENT AND TRADEMARK OFFICE